Pine

UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Entomology and Plant Quarantine

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ENTOMOLOGICAL WORK PLAN
for the
JULIAN - PINE HILLS - CUYAMACA PINE BEETLE CONTROL PROJECT
Season of 1948-49

The Julian-Pine Hills pine beetle control project was organized during 1947 by the State Division of Forestry to combat an outbreak of the five-spined engraver beetle (Ips confusus) and the western pine beetle (Dendroctonus brevicomis) which had developed in Coulter and ponderosa pine during the previous year. In this effort they were supported by the Julian Chamber of Commerce, local summer-home residents and ranchers, and financially assisted by the County of San Diego. Entomological supervision was provided by the Forest Insect Laboratory of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. This office also provided a work plan which outlined the procedure to be followed in recognizing and treating insect-infested trees.

Apparently, the Ips outbreak developed suddenly in the fall of 1946 following the build-up of Ips populations in logging slash left by the cutting of trees on several scattered private tracts. Drought conditions on the area undoubtedly played a part in making standing trees more susceptible. The infestation of Ips beetles, followed by western pine beetles, continued to increase during 1947 and, while no accurate count was made, it was estimated that approximately 6,000 trees were killed during 1947 in the Julian-Pine Hills units.

The State Division of Forestry, under the general supervision of Neil Rice from Deputy State Forester Mace's office in Riverside and under the leadership of Ranger Floyd Lewis of the Julian District, started control work on the first of December 1947. Treatment of infested trees continued through the winter and early spring months until the project was finally closed down on April 16, 1948, due to heavy emergence of overwintering broods. During this period, some 2,250 infested trees and poles were treated mostly by felling and burning. A few trees were treated with penetrating oil spray carrying DDT. Complete clean-up of infested trees was accomplished on portions of the area, notably around Whispering Pines and Pine Hills, while only partial coverage was obtained north of Julian, in the Kentwood and Harrison Park Units and in the Cuyamaca State Park.

Surveys made during the fall of 1948 indicated that the infestation had been reduced to less than one-fifth of that present in 1947. This reduction was accomplished in the face of critical drought conditions which prevailed all through 1948. It would appear that the control work had been very effective in breaking up Ips concentrations.

Present Status

During the fall of 1948 there was some renewed build-up of Ips populations and groups of fading trees began to appear, particularly in portions of the area not thoroughly covered with control work last year. A survey made in late November revealed that approximately 2,500 trees had been killed by pine beetles during 1948 of which some 670 contained broods at that time. Some groups of 15 or more infested trees were noted.

The 1948 infestation, while markedly reduced from that of 1947, is still epidemic in character and should be treated in order to bring this outbreak completely under control.

THE 1948-49 WORK PLAN

Since the control of Ips is still in the developmental stage, it is desirable to take advantage of what was learned from the work of last year to make improvements in control techniques this year. Therefore, this work plan has been prepared to show what modifications in the work plan of November 21, 1947, are considered to be desirable.

1. Units to be treated

The control work of last year was limited to portions of the Julian, Pine Hills, and Cuyamaca units. Essentially, the same areas should be covered again this year with extension of treatment to cover infested areas within these units which were not reached last year. It is particularly important to dispose of infestation north of Julian, and around summer-home tracts in Whispering Pines, Kentwood, and Pine Hills.

In Cuyamaca State Park, reinfestation is not badly scattered, but is limited for the most part to one ridge on west mesa near the location of last year's control work. The new infestation in this area should be cleaned up.

2. Trees to be treated

As in the plan of last year, trees to be treated are those currently infested with Ips beetles and the western pine beetle.

Trees to be spotted for treatment may be grouped in the following classes:

(a) Western pine beetle infested trees (D.b. trees)

Current infestations of this beetle can be recognized by basal examination of the trunk, evidence of pitch tubes and frass, and the finding of broods in the bark. Many top-killed trees, now

sorrel or red, will show work of this beetle in the lower bole. Western pine beetle infested trees should be felled, and the bark burned during the period December 1 to April 10.

(b) Ips trees

Trees currently infested with Ips will show some slight fading of the top or may be entirely green. "Sorrel tops" and "red tops" have now been largely abandoned by Ips broods, hence do not need to be treated for control of these beetles. Such winter work as is done for Ips control should be confined to newly fading groups of trees or those trees closely associated with groups of D. b. trees where they can be treated incidentally to the D. b. treatment.

The principal treatment for Ips control should be directed against the first spring broods in slash or standing trees during the period April 10 to July 31.

(c) Top-killed trees

Trees with sorrel or red tops, not currently showing signs of D. b. work on the lower bole, should be excluded from treatment. The amount of infestation disposed of in these tops, which are largely abandoned by the time they show a sorrel or red color, is not sufficient to justify the expense of treatment or the subsequent hazard of the uninfested green bole acting as a trap tree.

3. Methods of treatment

The method of treatment will vary with the species of bark beetle to be controlled, the weather conditions encountered as well as the location of infested trees. This year it is planned to carry out some experimental work, using penetrating oil sprays on standing trees.

D. b. infested trees should for the most part be felled and the bark burned. If the tree is very large or limby, it will be found to be expedient to peel the top half of the trunk and burn the bark along the trunk. For smaller trees it is undoubtedly easier to cut them into small sections and burn all of them in one pile.

Ips infested trees which carry heavy overwintering broods, at least partly in the larval stage, should be treated by felling and burning during the winter control period. It is not recommended that top-killed trees or trees with sorrel or red crowns which were killed by Ips in the late fall of 1948 should be included in the control treatment unless these are in or near groups of western pine beetle infested trees and can be burned with these other trees.

When burning conditions become hazardous and after April 1, all treatment of Ips trees and slash will be by the use of toxic oil sprays. For this purpose, the following formula is recommended:

DDT, technical grade	1 lb.
Solvent (Shell Solvent #42, or Socal Solvent)	½ gal.
Fuel oil No. 2	3 gals.

The DDT is first mixed in the solvent to obtain a 20% DDT concentrate; then it is mixed with the fuel oil to obtain approximately a 3.7% DDT solution. This should be applied at the rate of approximately 3 gallons of spray per tree.

4. Timing of treatment

Treatment of western pine beetle and overwintering Ips broods by burning should be carried on during the period December 1 to April 10. The closing date will depend somewhat on whether the season is earlier or later than usual.

Treatment of the first spring broods of Ips should be carried on during the period April 10 to July 31.

5. Preventive treatments

(a) Through slash disposal or treatment

Preventing damage from Ips beetles can be largely obtained through control of beetle populations in slash and weak trees during the spring and early summer months. This can be accomplished by either burning the slash, topping and scattering it so that it will be subject to the full force of the sun's rays, or spraying it before attack with a DDT spray. Spraying slash after it has become infested has not proven too effective unless the slash is turned and sprayed on all sides. It is difficult to get good coverage of compact slash piles. As was stated last year, the success of this project will depend upon how well infested spring slash is cleaned up and beetles destroyed.

(b) Through protective sprays

So far, a thoroughly reliable protective spray has not been developed for preventing pine beetle attacks on particularly valuable trees. Sprays developed in the East for protecting elms against elm bark beetles have not proved effective in stopping pine beetle attack. Those sprays which are effective in stopping pine beetles are so injurious to foliage that they cannot be safely used on green trees. Some further experimental work will need to be done to develop a spray suitable for this specific purpose. Some such work may be possible on the Julian area this year.

Experimental Control Through Spraying Standing Infested Trees

Recent control projects in the Rocky Mountain Region and Black Hills of South Dakota have been using a modification of the oil-spraying method of bark-beetle control in that trees are sprayed while still standing. Short timber and thin bark has made this method practical for these projects. It is thought that this method might be equally satisfactory in this region for the treatment of Ips and other bark beetles which operate under the thin bark of short trees.

Accordingly, it is proposed to test the standing tree-spraying method for the control of Ips in Coulter pines on the Julian project area during the period March 1 to 15, 1949. Since this method is best adapted to areas easily accessible to heavy spray equipment, it is proposed that this test be applied to the treatment of overwintering Ips-infested trees, where they can be easily reached from existing roads. Approximately 100 trees should be treated by each of the following formulae:

(1)	Orthodichlorobenzene, crude	1 part by volume
	Fuel oil #2	6 parts by volume
(2)	DDT, technical grade	1 pound
	Solvent (Shell Solvent #42, or Socal Solvent).	½ gallon
	Fuel oil #2	3 gallons

A 3.7% DDT spray to be applied at the rate of approximately 3 gallons per tree.

Special Equipment Needed

The State Division of Forestry has a four-wheel drive Power Wagon with a 125-gallon black iron tank and Bean spray piston pump which is capable of 600 pounds per square inch pressure and an output of 5 gallons per minute. This should prove very suitable for the experimental spray work.

The sprayer should be equipped with:

100 feet of high pressure Neoprene hose with inside diameter of 3/8"
1 spray gun (Bean Spraymaster) equipped with No. 7 and No. 4 discs
2 - 55-gallon drums for carrying and mixing spray
2 Neoprene aprons and helmets to protect nozzleman

Amounts of Chemical Needed and Approximate Costs

On the basis of treating approximately 100 trees with each of the two formulae, it is estimated that the following amounts of spray materials will be needed:

Orthodichlorobenzene	55 gallons (1 drum)
DDT, technical grade	120 pounds
Solvent (Shell or Socal)	55 gallons (1 drum)
Fuel oil #2	700 gallons

Protection of Workers from Spray

Spraying standing trees with oil involves some hazard to workers and considerable discomfort, for it is practically impossible for the nozzleman to avoid getting drenched with spray. DDT-oil sprays are slightly toxic to humans and will penetrate the skin. Ortho-oil spray is less toxic but equally uncomfortable and oil-soaked clothing will cause irritation and burns. The only remedy is to thoroughly wash with soap and water as soon as convenient after contact. Should either of the sprays get into the eyes, it should be immediately washed out and a weak solution of boracic acid applied.

Neoprene ponchos and aprons will give some protection to the body, and sou'-wester head gear of Neoprene will give good protection to the head and neck. The difficulty is getting workers to wear these protective garments. Goggles give some protection to the eyes but as spray soon covers them with a film of oil, vision is greatly impaired and necessitates frequent cleaning. A Neoprene face shield, like a welder's hood, is another method of keeping spray out of the face and eyes but impairs visibility.

There is considerable fire hazard in the spray work when air temperatures range above 75 degrees. Therefore, matches should not be carried by workers near the sprayer or spray materials. Smoking should not be permitted on the spray job. Exhaust pipes on motor vehicles used to transport spray should be moved or protected from oil drippage, as the fire hazard to motor vehicles may be high.

Cooperation

It is the plan of this office to give this experimental work direct supervision and to follow it with checks on brood conditions to determine effectiveness. The assistance of the State will be needed in furnishing the spray material, in applying the spray, and in setting up cages for checking beetle emergence. These phases of the work, the manpower needs, and financing will be developed through conferences with the Deputy State Forester and local State officers on the ground.

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APPENDIX

Orthodichlorobenzene, crude, may be obtained from the following companies:

Braun-Knecht-Herman Co., 1400 - 16th St., San Francisco, Calif.
Dow Chemical Co., 310 Sansome Street, San Francisco, Calif.
Monsanto Chemical Co., 111 Sutter St., San Francisco, Calif.
Los Angeles Chemical Co., 1960 Santa Fe Ave., Los Angeles, Calif.
L. H. Butcher Co., 2030 Bay St., Los Angeles, Calif.
Mefford Chemical Co., 1026 Santa Fe Ave., Los Angeles, Calif.

DDT may be obtained from many sources, including the following local concerns:

Braun-Knecht-Herman Co., 1400 - 16th St., San Francisco, Calif.
California Spray Chemical Co., Richmond, Calif.
Eaton Chemicals, Inc., 3100 E. 26th St., Los Angeles 23, Calif.
Griffen Chemical Co., 1000 - 16th St., San Francisco, Calif.
Leffingwell Co., P. O. Box 191, Whittier, Calif.
Monsanto Chemical Co., 111 Sutter St., San Francisco, Calif.
Stauffer Chemical Co., 636 California St., San Francisco, Calif.

Solvent for DDT may be obtained from:

Standard Oil Co. of Calif. - "Socal solvent"
Shell Oil Co. - "Shell Solvent #42"
(or other oil companies)

Fuel oil #2 may be obtained from any oil company.